

Monkeypox in the United States
A Report to the Secretary's Council on
Public Health Preparedness
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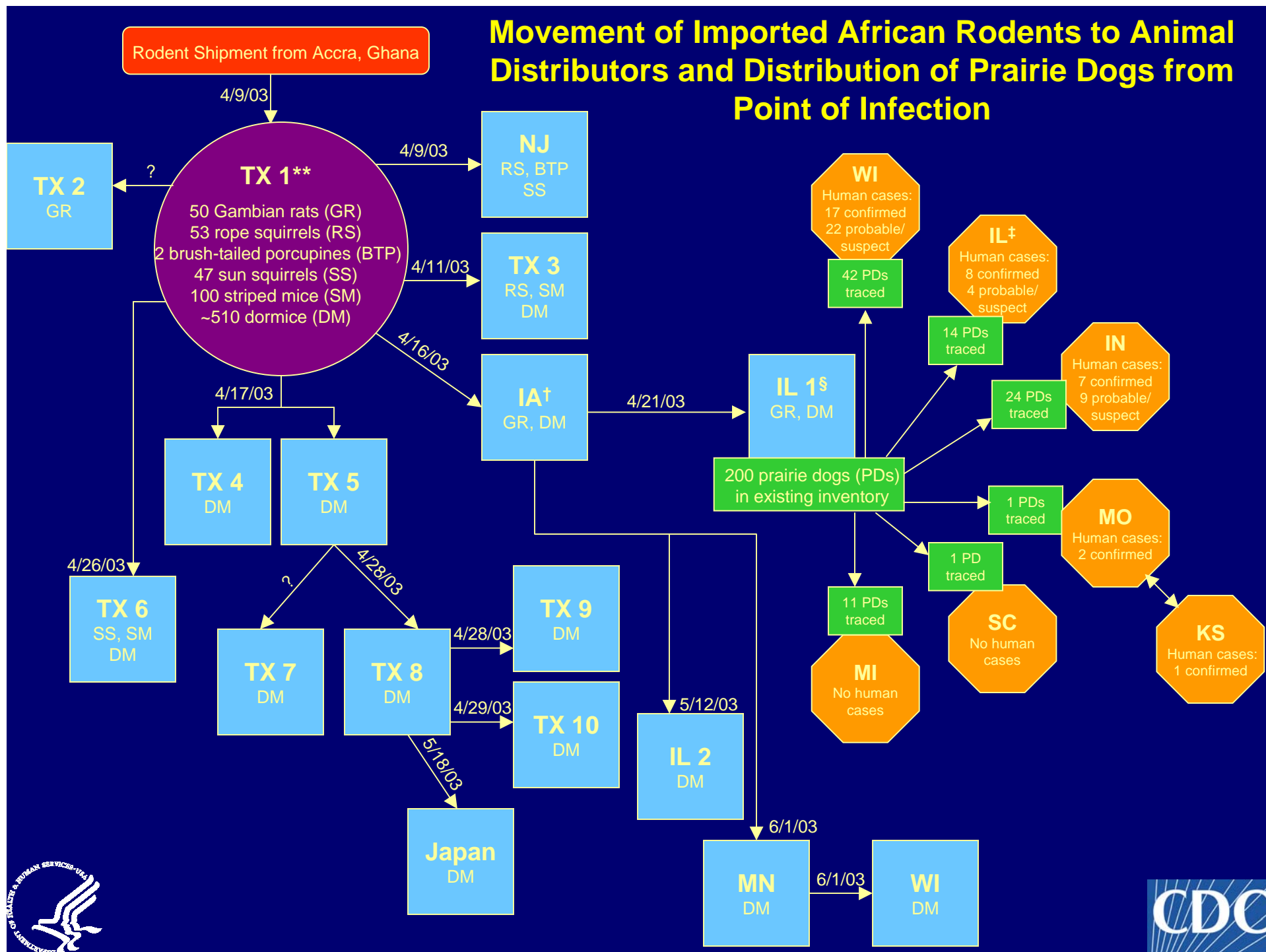


Introduction

- Review the 2003 outbreak of monkeypox
- Describe the outbreak control measures used
- Summarize data on the types of animals that can be infected with monkeypox
- Describe what is known about the duration of infectiousness of monkeypox
- Summarize information from field investigations
- Describe additional public health risks associated with prairie dogs
 - Plague
 - Tularemia



Movement of Imported African Rodents to Animal Distributors and Distribution of Prairie Dogs from Point of Infection



Outbreak Control Considerations

- Types of susceptible species unknown
- Unknowns:
 - Incubation period
 - Length of transmissibility
 - Potential for asymptomatic infection
 - Transmission
- No reliable ante-mortem laboratory tests to rule out the presence of monkeypox infection in a variety of species



Outbreak Control Measures

- Recommended euthanasia for the involved imported African rodents and prairie dogs
- CDC & FDA issued Joint Order
 - Restricted importation of all African rodents
 - Restricted domestic movement of the 6 genera of African rodents and prairie dogs



Interim Final Rule - 42 CFR 71.56

- Codified joint order; effective November 4, 2003
- Restricts import of any rodents or rodent products obtained, directly or indirectly, from Africa
- Restricts* trade, transportation, or release into the environment of 6 genera of African rodents and prairie dogs
- Exceptions:
 - Animals being transported for scientific, exhibition, or educational purposes
 - Animal products processed to render them non-infectious

* Domestic provisions can be amended



Monkeypox host range

- Rodents likely reservoir
 - Multiple orders of mammals susceptible
 - Animals involved in this outbreak evaluated by viral culture, PCR, serology, and immunohistochemical staining of tissues
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- | | |
|------------------------------|--------------|
| • Humans | • Hedgehog |
| • Prairie dogs | • Jerboa |
| • Gambian giant pouched rats | • Opossums |
| • Dormice | • Gerbils |
| • Rope squirrels | • Hamsters |
| • Ground hog | • Chinchilla |



Monkeypox infection of prairie dogs

- All human cases associated with prairie dogs
- Evidence of infectious virus from multiple sites
 - Saliva
 - Tongue
 - Respiratory tract
- Exhibited multiple clinical syndromes
 - Skin lesions
 - Oral lesions
 - Necrotizing broncopneumonia
- Greater viral burden than dormice



Duration of infectiousness

- Data in the scientific literature sparse
 - Anecdotal reports of remaining infectious 3-6 weeks after exposure
 - Latent infections occur
- Data from outbreak
 - One dormouse remained culture positive 14 weeks after importation from Africa, and another PCR positive 8 months after importation
 - Human case remained symptomatic and PCR and culture positive for 5 months



Ecological studies

- Wisconsin and Illinois
 - Collected animals around pet stores and dumping sites
 - No animals showed evidence of monkeypox infection
- Ghana
 - Serologic evidence of orthopox infection in multiple rodent species
 - PCR, culture data in animals and serologic data in humans pending



Plague and prairie dogs

- *Yersinia pestis* – enzootic in the Western U.S.
- During 1954 – 2003, 416 human plague cases reported in the U.S.
 - 15% of 222 with known probable sources of exposure were associated with prairie dog contact
- Outbreak of plague in 1998 among 500 prairie dogs captured for the exotic pet trade
- Prevalence of plague among prairie dog fleas 12 – 48%



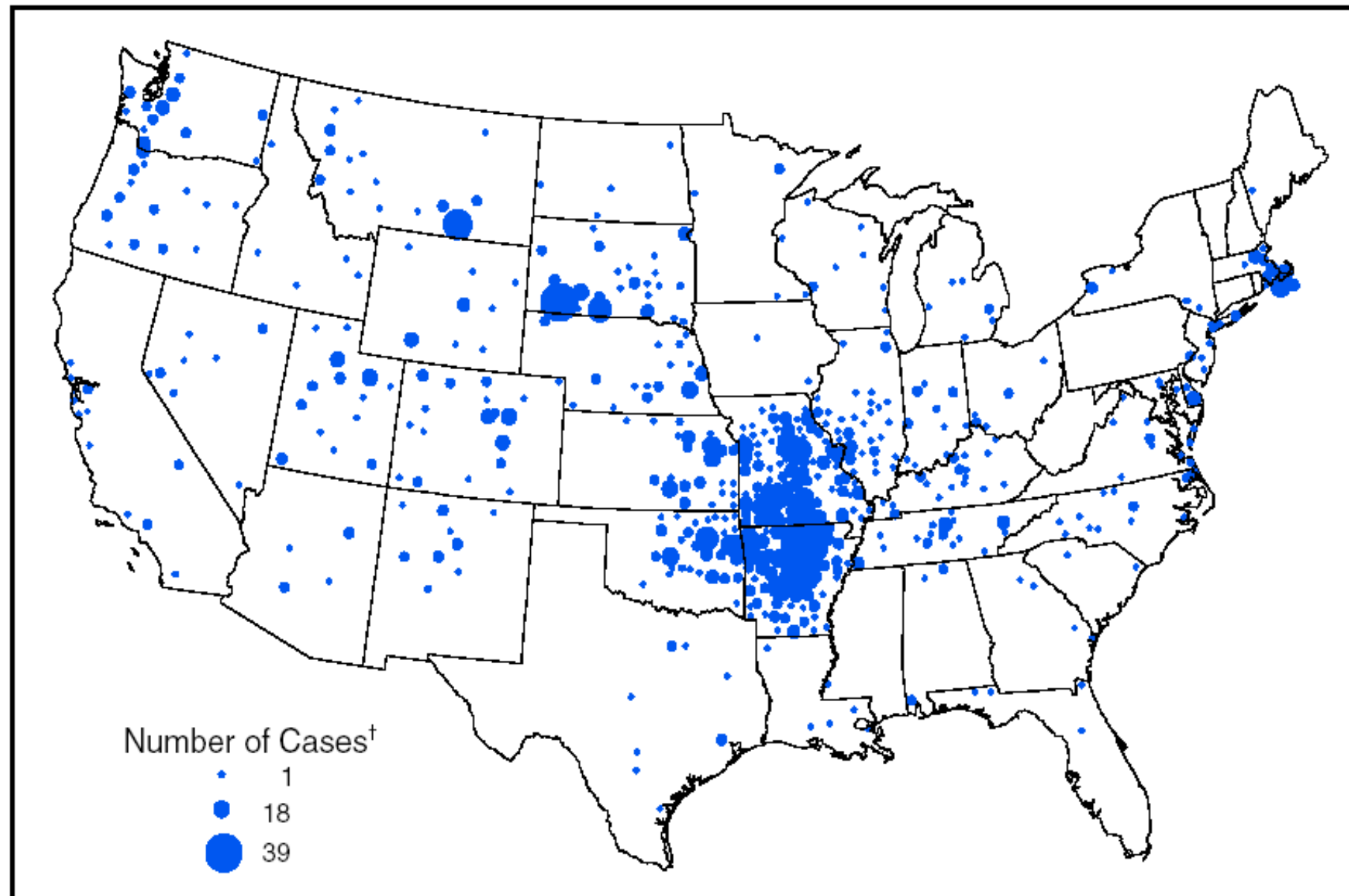
Plague and prairie dogs

Control strategies

- Plague is lethal among prairie dogs
 - a quarantine period could be determined
- Laboratory screening would not be feasible
- No proven antibiotic regimens
- Need to control infected fleas also



FIGURE 2. Reported cases* of tularemia — United States, 1990–2000



* Based on 1,347 patients reporting county of residence in the lower continental United States. Alaska reported 10 cases in four counties during 1990–2000.

† Circle size is proportional to the number of cases, ranging from 1–39.

Tularemia and prairie dogs

- *Francisella tularensis* – enzootic among rodents and lagomorphs
- Laboratory prairie dog-associated tularemia
- Pet prairie dog-associated tularemia
 - Outbreak (type B) among 3,600 prairie dogs shipped to 10 states and 5 other countries
 - 1 human case
- Outbreak (type A) among prairie dogs at a USFWS facility



Tularemia and prairie dogs

Control strategies

- Prairie dogs may be chronically infected, limiting the utility of quarantine
- Laboratory screening would not be feasible
- No proven antibiotic regimens



Support for regulation of exotic animals

The National Association of State Public Health Veterinarians and the Council of State and Territorial Epidemiologists issued a joint resolution supporting the restrictions on the importation, exportation, and movement of exotic and native wildlife with potential adverse impact on public health.



Summary

- Prairie dogs are highly susceptible to and highly efficient in transmitting multiple diseases of public health significance
 - Monkeypox
 - Tularemia
 - Plague
- Commercial trade in exotic pets routinely distributes thousands of prairie dogs annually
- From a public health standpoint, a prairie dog is not a good choice as a pet

